Docket No.EN 997170B
(20135-00319-US)
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:
Michael A. Gaynes, Et, et al.

Application No.: 09/593,446 Group Art Unit: 1771

Filed: June 15, 2000 Examiner: H. Vo

For: BONDING TOGETHER SURFACES

APPELLANT'S BRIEF UNDER 37 C.F.R. 1.192

Attention: Board of Patent Appeals and Interferences
Commissioner for Patents
Washington, DC 20231

Dear Sir:

This is an Appeal from the final rejection of claims 31, 32 and 34-38..

The fees required under § 1.17(f) and any required petition for extension of time for filing this brief and fees therefor, are dealt with in the accompanying TRANSMITTAL OF APPEAL BRIEF.

This brief is transmitted in triplicate.

This brief contains items under the following headings as required by 37 C.F.R. § 1.192 and M.P.E.P. § 1206:

I. REAL PARTY IN INTEREST

The real party in interest for this appeal is:

International Business Machines Corporation

II. RELATED APPEALS AND INTERFERENCES

There are no other appeals or interferences know to appellant, appellant's legal representative or assignee which will directly affect or be directly affected by or have a bearing on the Board's decision in this Appeal.

III. STATUS OF CLAIMS

Claims 1-38 are in the Application. Claims 1-30 have been canceled. Claims 31-38 are pending. Claims 31, 32 and 34-38 were finally rejected and are on appeal. Claim 33 was merely objected to as being dependent upon a rejected claim.

IV. STATUS OF AMENDMENTS

The amendment filed after the Final Office Action was not entered by the Examiner.

V. SUMMARY OF INVENTION

The present invention relates to an article for fabricating large liquid crystal displays. The present invention provides a flat cover plate and a flat back plate together wherein one of the plates has a smaller surface than that of the other. The plates are bonded together by an adhesive that is void-free and exhibits a wavelike undulating profile at edges of the smaller of the plates. (See page 4, lines 12-19)

A variety of industrial and commercial applications require bonding surfaces together and, in certain instances, flat surfaces having relatively large areas. (Page 1, lines 19-21). Included in these applications are microelectronics applications for bonding liquid crystal display assemblies. (Page 1, lines 21-26). When laminating or bonding flat surfaces with a liquid adhesive, the ever present problem of air entrapment requires special attention. (Page 1, lines 26-28). For instance, even though a surface may appear flat or planar, small topographic variations allow contacting at multiple points during mating. (Page 2, lines 1-3). As the adhesive spreads from such multiple points, the advancing fronts can meet and thereby trap pockets of air. (Page 2, lines 3-5).

The larger the area of the mating surface, the higher the incidence of air entrapment. Furthermore, the lower the viscosity of the adhesive, the higher the incidence of air entrapment. (Page 2, lines 6-9).

Trapped air, depending upon the desired product, presents problems of varying degrees. (Page 2, lines 10-11). The bonding of the back plate and cover plate to the liquid crystal display tiles should be as void-free as possible. Page 3, lines 16-18). In order to achieve a void-free bond, proper dispensing of the adhesive mass along with providing a pattern that allows spreading out from the center outward and sweeping air out as the front advances must be achieved. (Page 2, lines 12-22). In addition, the surfaces to be bonded must be mated parallel to each other. (Page 2, lines 22-23). It is also desirable that the point contact of the mating surfaces with the adhesive between them be controlled and that the pattern employed permit complete coverage of the surface area of the mating substrates regardless of shape. (Page 2, lines 23-28). Also, it is necessary to control the bond line. (Page 2, lines 28-29).

With respect to these requirements, the proper dispensing of the adhesive mass can be readily achieved employing metered dispense units well known in the art. (Page 3, lines 1-3). Moreover, as described in the specification, it has previously been determined that an X pattern extending the entire diagonal length of the surfaces to be bonded is necessary for achieving complete coverage. (Page 3, lines 4-c). Furthermore, a majority of the adhesive should be dispensed in the center of the adhesive pattern since spreading is initiated in the center, and spreads out radically. (Page 3, lines 8-9). However, even when employing an X pattern with the diagonal spokes extending all the way to the corners of the surface to be bonded, a void-free bond line is not necessarily achieved. (Page 3, lines 14-17).

The present invention addresses the above concerns and results in a void-free bond. (Page 3, lines 19-21).

ISSUES

A. Has the Examiner established that claim 31 is anticipated and therefore unpatentable under 35 USC 102(b) over the cited art and namely over US Patent 4,803,124 to Kunz?

B. Has the Examiner established that claim 31 is anticipated and therefore impatentable under 35 USC 102 (b) over the cited art and namely over US Patent 5,187,123 to Yoshida et al.?

C. Has the Examiner established that claims 31, 32 and 34-37 are anticipated and therefore unpatentable under 35 USC 102 (b) over the cited art and namely over US Patent 4,715, 686 to Iwashita?

D. Has the Examiner established that claim 38 is obvious and unpatentable under 35 USC 103 (a) over US Patent 4,715,686 to Iwashita in view of US Patent 5,808,710 to Pierson?

VI. GROUPING OF CLAIMS

For purposes of this appeal brief only, and without conceding the teachings of any cited reference, the claims have been grouped as indicated below:

Claims 34-37 do not stand or fall together with claims 31 and 32.

In Section VII below, Applicant has included arguments supporting the separate patentability of each claim group as required by M.P.E.P. § 1206.

VII. ARGUMENTS

A. Kunz Fails to Anticipate Claim 31

Claim 31 as rejected under 35 USC 102(b) as being anticipated by US Patent 4,803,124 to Kunz. Kunz does not anticipate claim 31.

The present invention relates to an article for fabricating large liquid crystal displays. The present invention provides a flat cover plate and a flat back plate bonded together by an adhesive that is void-free and exhibits a wavelike undulating profile at edges of one of the plates.

A variety of industrial and commercial applications require bonding surfaces together and, in certain instances, flat surfaces having relatively large areas. Included in these applications are microelectronics applications for bonding liquid crystal display assemblies and especially relatively large liquid crystal display assemblies and heat-sink attachments, and such commercial applications as windowpane glass and auto windshield applications. When laminating or bonding flat surfaces with a liquid adhesive, the ever present problem of air entrapment requires special attention. For instance, even though a surface may appear flat or planar, small topographic variations allow contacting at multiple points during mating. As the adhesive spreads from such multiple points, the advancing fronts can meet and thereby trap pockets of air.

The larger the area of the mating surface, the higher the incidence of air entrapment. Furthermore, the lower the viscosity of the adhesive, the higher the incidence of air entrapment.

Trapped air, depending upon the desired product, presents problems of varying degrees. For instance, when dealing with bonding large liquid crystal display assemblies, the individual LCD tiles are arranged in a matrix and secured to a tile carrier. The tile carrier typically includes a cover plate and a back plate with the LCD tiles sandwiched between them. The bonding of the back plate and cover plate to the liquid crystal display tiles should be as void-free as possible. In order to achieve a void-free bond, proper dispensing of the adhesive mass along with providing a pattern that allows spreading out from the center outward and sweeping air out as the front advances must be achieved. In addition, the surfaces to be bonded must be mated parallel to each other. It is also desirable that the point contact of the mating surfaces with the adhesive between them be controlled and that the pattern employed permit complete coverage of the surface area of

the mating substrates regardless of shape such as rectangular, square or polygon. Also, it is necessary to control the bond line.

With respect to these requirements, the proper dispensing of the adhesive mass can be readily achieved employing metered dispense units well known in the art. Moreover, as described in the specification, it has previously been determined that an X pattern extending the entire diagonal length of the surfaces to be bonded is necessary for achieving complete coverage. Furthermore, a majority of the adhesive should be dispensed in the center of the adhesive pattern since spreading is initiated in the center, and spreads out radially. Nevertheless, it has been found that regardless of the pattern geometry in the center, e.g. circular, elliptical, square, smaller scale X pattern and the like, the geometry of the spreading area quickly reverts to circular or elliptical. However, even when employing an X pattern with the diagonal spokes extending all the way to the corners of the surface to be bonded, a void-free bond line is not necessarily achieved.

The present invention addresses the above concerns and results in a void-free bond.

U.S. Patent 4,803,124 to Kunz does not anticipate the present claims and does not result in a void-free bond or wave undulating profile at edges of the adhesives. In fact, Kunz is similar to the prior art discussed in the specification.

The process suggested by Kunz is along the lines of the processes discussed on page 3 of the specification and suffers from the same shortcomings disclosed in the specification. In particular, as disclosed in the specification, even with a majority of adhesive in the center and employing an X pattern, a void-free bond line is not necessarily achieved when dealing with large area surfaces.

Kunz relates to dispensing die attach adhesives. The present invention is especially concerned with bonding relatively large area surfaces together such as liquid crystal displays. Significant differences exist between void-free die and void-free LCD bonding.

For instance, dies range in size typically from 0.08 to 0.8 inches square. LCDs, on the other hand, typically are 14 inches by 10 inches and cover plates are four times as large in area, being 28 inches by 20 inches. Some level of voiding is tolerable in die attach and indeed occurs characteristically with die attach materials, notwithstanding the suggestions in Kunz. In order to tailor the dispense rheology for high speed, controlled volume dispensing, adhesive manufacturers use reactive diluents and low molecular weight starting monomers. The adverse effect of this material design is that during cure, the reactive-diluent and sometimes even the monomer will volatilize and cause noticeable voiding, thus defeating the benefit of Kunz. This voiding is very common and is readily observable by bonding a chip to a glass slide with the die attach adhesive.

In contrast, the LCD application must be optically clear. Any void between the LCD and coverplate stands out and is a blemish to the viewer. Essentially, the objective of LCD applications is to eliminate voids entirely and over an area that is two orders of magnitude larger than chip attach applications.

Also, the die attach and LCD applications differ from each other in rheology of the adhesive. While the die attach materials are thixotropic or resisting a natural tendency to flow and self level, the LCD adhesives need to possess a high propensity to flow, in order to wet the very large surface areas with a reasonable mating force. Consequently, on dispensing the LCD adhesive to a coverplate in preparation for LCD mating, the adhesive immediately begins to flow and self level. Self leveling is in opposition to void-free mating because it presents a flat surface over a large area. Mating large area adherents with an intrinsically self leveling adhesive interposed will experience multiple point contacts. Thus, several flow fronts grow and when these merge, frequently a pocket of air is trapped. One of these will result in a scrapped LCD assembly. As discussed above, this is the problem addressed by the present invention.

Moreover, the adhesives suggested by Kunz would not be suitable for LCD assemblies since they are not clear as would be required for a LED. The adhesives of Kunz contain metallic particles such as silver. See col. 4, lines 1-4. Moreover, the

adhesives of Kung are not self-leveling but instead retain their shape after being dispensed. In other words, thee adhesives are thixotropic and contain filler.

Accordingly, the technique suggested by Kunz would not inherently result in a void-free bond in the articles of the present invention and could not inherently result in the adhesive being undulating at its edges.

A. Yoshida et al. Fail to Anticipate Claim 31

Claim 31 was rejected as being anticipated by U.S. Patent 5,187,123 to Yoshida et al. Yoshida et al., like Kunz, relate to a die attach process and not an LCD application employing a paste presented in an array of spots. The specific adhesive is a silver epoxy paste. The paste and process of this reference would not inherently result in a void-free bond over the much larger area as required by the present invention. Also the perimeter of the adhesive would not be undulating but instead, regular such as circular or elipitical. In addition, the adhesive paste suggested by Yoshida et al. would not be suitable for LCD assemblies since they are not clear as would be required for a LCD. The adhesives of Yoshida et al. contain silver particles.

B. Yoshida et al. Fail to Anticipate Claims 31, 32 and 34-37.

Claim 31, 32 and 34-37 were rejected under 35 U.S.C. §102(b) as being anticipated by U.S. Patent 4,715,686 to Iwashita et al. Iwashita et al. do not anticipate claims 31, 32 and 34-37. In particular, Iwashita fail to anticipate the above claims since, among other things, Iwashita et al. fail to suggest an adhesive that exhibits a wave undulating profile at the edges of the smaller surface. The adhesives suggested by Iwashita et al., e.g. – films, embossed films and hot melts, would not inherently result in a wave undulating profile at the edges of the smaller surface. Moreover, it seems apparent from Iwashita et al. that to achieve "no air bubbles", an embossed film must be employed(see column 5, lines 1-5 and column 6, lines 4-9).

C. Additional Reasons as to Why Claims 34-37 Do Not Stand or Fall Together With Claims 31 and 32.

Claims 34-37 do not stand or fall together with 31 and 32 since, among other things, Iwashita et al. fail to suggest the viscosity of the adhesive recited in these claims. The adhesives explicitly mentioned by Iwashita would not inherently possess the relatively low viscosities recited in these claims. In fact, if anything, Iwashita et al. lead away from the claimed adhesives since Iwashita, as mentioned above, require a pre-embossed sheet for a "no-air bubbles" assembly. Such sheets would not possess the claimed viscosities. Use of adhesives with the claimed viscosities would be contrary to these suggestions in Iwashita et al.

Further reference in Iwashita et al. to use of films or sheets can be found at column 2, line 19 and column 6, lines 2-9. For instance, column 6, lines 2-4 state: "Further, since the adhesives are in the form o f films, they can be handled easily."

D. Iwashita et al. and Pierson Do not Render Obvious Claim 38.

Claim 38 was rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent 4,715, 686 to Iwashita et al. view of U.S. Patent 5,808, 710 to Pierson. Iwashita et al. in view Pierson fail to render obvious claim 38. Pierson was relied upon for disclosure of a urethane acrylate adhesive in fabricating liquid crystal displays. Pierson does not overcome the above discussed deficiencies of Iwashita inter respect to rendering obvious claim 38. Accordingly, claim 38 is patentable for at least these reasons as to very claim 34 is patentable.

E. Case Law of Interest

Concerning the rejections under 35 U.S.C § 102, the cited references fail to anticipate the present invention. In particular, anticipation requires the disclosure, in a prior art reference, of each and every recitation as set forth in the claims. *See Titanium*

Metals Corp. v. Banner, 227 USPQ 773 (Fed. Cir. 1985), *Orthokinetics, Inc. v. Safety Travel Chairs, Inc.*, 1 USPQ2d 1081 (Fed. Cir. 1986), and *Akzo N.V. v. U.S. International Trade Commissioner*, 1 USPQ2d 1241 (Fed. Cir. 1986).

There must be no difference between the claimed invention and reference disclosure for an anticipation rejection under 35 U.S.C. 102. *See Scripps Clinic and Research Foundation v. Genetech, Inc.*, 18 USPQ2d 1001 (CAFC 1991) and *Studiengesellschaft Kohle GmbH v. Dart Industries*, 220 USPQ 841 (CAFC 1984).

Furthermore, the cited references do not inherently disclose the present invention. For instance, see *In re Robertson et al.* 49 USPQ2d 1949 (1999 Fed. Cir.). In this case, Robertson, filed a patent application concerning a paper diaper. The application claimed a paper diaper having (a) two fasteners so that the diaper could be worn on a baby and (b) a third fastener for rolling up and fixing the used diaper. The Patent Office rejected the invention under 35 USC 102 based on "Principles of Inherency" as the invention is "anticipation" by the prior art.

The prior art (Wilson) relied upon disclosed a diaper, which had two snaps in front and back of the diaper in order to be worn by a baby and which may further have a strip in order to fasten the diaper to baby's body. Wilson describes that the used diaper can be easily dealt with by rolling up and fixing it with the snaps. Accordingly, the Patent Office considered that the diaper of Wilson inherently has an ability to be rolled up and fixed after use and decided that the claimed diaper is anticipated by the diaper of Wilson. The Federal Circuit; however, held that it is recognized that the constitution of the invention is inherently present in the prior art, only when it is clearly shown that the constitution of the invention is necessarily present in the prior art by external evidence. The invention can not be rejected based on "inherency" because of probability or possibility of the presence of the constitution in the prior art. Also see *Crown Operations International Ltd. v. Solutia* 24 USPQ 2d 1917 (Fed. Cir. 2002).

Also, the cited art lacks the necessary direction or incentive to those or ordinary skill in the art to render under 35 USC 103 sustainable. The cited art fails to provide the degree of predictability of success of achieving the properties attainable by the present invention needed to sustain a rejection under 35 USC 103. See *In re Lee* 61 USPQ2d 1430 (Fed. Cir. 2002), *Diversitech Corp. v. Century Steps, Inc.* 7 USPQ2d 1315 (Fed. Cir. 1988), *In re Mercier*, 187 USPQ 774 (CC)A 1975) and *In re Naylor*, 152 USPQ 106 (CCPA 1966).

Moreover, the properties of the subject matter and improvements which are inherent in the claimed subject matter and disclosed in the specification are to be considered when evaluating the question of obviousness under 35 USC 103. See *Gillette Co. v. S.C. Johnson & Son, Inc.*, 16 USPQ2d. 1923 (Fed. Cir. 1990), *In re Antonie*, 195, USPQ 6 (CCPA 1977), *In re Estes*, 164 USPQ (CCPA 1970), and *In re Papesch*, 137 USPQ 43 (CCPA 1963).

No property can be ignored in determining patentability and comparing the claimed invention to the cited art. Along these lines, see *In re Papesch*, supra, *In re Burt et al*, 148 USPQ 548 (CCPA 1966), *In re Ward*, 141 USPQ 227 (CCPA 1964), and *In re Cescon*, 177 USPQ 264 (CCPA 1973).

Conclusions

In view of the above, it is abundantly clear that the primary Examiner has error in the final rejection of claims 31, 31 and 34-38. Accordingly, it is requested that the Board review the Primary Examiner and allow claims 31, 32 and 34-38.

The Director is hereby authorized to charge any fees, or credit any overpayment, associated with this communication, including any extension fees, to CBLH Deposit Account No. 22-0185.

VIII. CLAIMS INVOLVED IN THE APPEAL

A copy of the claims involved in the present appeal is attached hereto as Appendix A. As indicated above, the claims in Appendix A do include the amendments filed by Applicant on January 31, 2003.

Dated: 6-6-03

Respectfully submitted,

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APPENDIX A

Claims Involved in the Appeal of Application Serial No. 09/593,446

31. An article for fabricating large liquid crystal displays comprising a flat cover plate and flat back plate bonded together wherein one of the plates has a smaller surface area that of the other of the plates;

said plates are bonded together by an adhesive located between said plates over the entire area of the smaller area surface; said adhesive being void-free and exhibiting a wave undulating profile at the edges of the smaller surface.

32. The article of claim 31 wherein said adhesive is a cured thermosetting adhesive.

34. The article of claim 31 wherein the adhesive had a viscosity of less than 30,000 centipoise and is self leveling in the uncured state.

35. The article of claim 31 wherein the adhesive had a viscosity of about 1,000 centipoise in the uncured state.

36. The article of claim 34 wherein the adhesive is an acrylic adhesive.

37. The article of claim 34 wherein the adhesive is a silicon.

38. The article of claim 34 wherein the adhesive is a urethane acrylate.